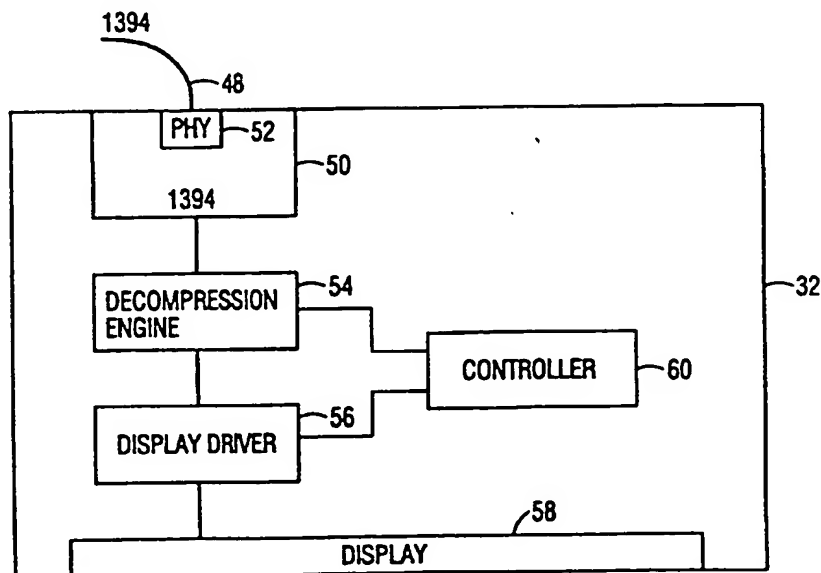|		
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(54) Title: METHOD OF AND APPARATUS FOR SEPARATING AUDIO AND VIDEO DATA FROM A COMBINED DATASTREAM

(57) Abstract

A separator circuit receives a stream of data including both audio and video components. The separator circuit separates the audio and video components for transmission to appropriate devices. In the preferred embodiment, the separator circuit is part of a decompression engine which decompresses the received stream of data and also separates the audio and video components. Preferably, the decompression engine is implemented within a device configured for coupling to an IEEE 1394-1995 serial bus network (48). Alternatively, the decompression engine is implemented as a separate dedicated device within the IEEE 1394-1995 serial bus network (48). After separating the audio and video components, one or both of those components are transmitted from the decompression engine over one or more isochronous channels on the IEEE 1394-1995 serial bus (48), to the appropriate devices. When the decompression engine is implemented within a device, an appropriate one of the audio or video components is sent to circuits within the device while the other component is transmitted over the IEEE 1394-1995 serial bus (48).

METHOD OF AND APPARATUS FOR SEPARATING AUDIO AND VIDEO DATA FROM A COMBINED DATASTREAM

FIELD OF THE INVENTION:

5   The present invention relates to the field of displaying a video stream of data while simultaneously playing an accompanying audio stream of data. More particularly, the present invention relates to the field of receiving a combined stream of data including both audio and video components and separating the audio and video components.

10

BACKGROUND OF THE INVENTION:

The IEEE standard, "IEEE 1394 Standard For A High Performance Serial Bus," Draft ratified in 1995, is an international standard for implementing an inexpensive high-speed serial bus architecture which supports both asynchronous and isochronous format

15   data transfers. Isochronous data transfers are real-time transfers which take place such that the time intervals between significant instances have the same duration at both the transmitting and receiving applications. Each packet of data transferred isochronously is transferred in its own time period. The IEEE 1394-1995 standard bus architecture provides multiple channels for isochronous data transfer between applications. A six bit

20   channel number is broadcast with the data to ensure reception by the appropriate application. This allows multiple applications to simultaneously transmit isochronous data across the bus structure. Asynchronous transfers are traditional data transfer operations which take place as soon as possible and transfer an amount of data from a source to a destination.

25   The IEEE 1394-1995 standard provides a high-speed serial bus for interconnecting digital devices thereby providing a universal I/O connection. The IEEE 1394-1995 standard defines a digital interface for the applications thereby eliminating the need for an application to convert digital data to analog data before it is transmitted across the bus. Correspondingly, a receiving application will receive digital data from

30   the bus, not analog data, and will therefore not be required to convert analog data to digital data. The cable required by the IEEE 1394-1995 standard is very thin in size compared to other bulkier cables used to connect such devices. Devices can be added

and removed from an IEEE 1394-1995 bus while the bus is active. If a device is so

added or removed, the bus will then automatically reconfigure itself for transmitting data

between the then existing nodes. A node is considered a logical entity with a unique

address on the bus structure. Each node provides an identification ROM, a standardized

5   set of control registers and its own address space.

The IEEE 1394-1995 standard defines a protocol as illustrated in Figure 1. This

protocol includes a serial bus management block 10 coupled to a transaction layer 12, a

link layer 14 and a physical layer 16. The physical layer 16 provides the electrical and

mechanical connection between a device or application and the IEEE 1394-1995 cable.

10   The physical layer 16 also provides arbitration to ensure that all devices coupled to the

IEEE 1394-1995 bus have access to the bus as well as actual data transmission and

reception. The link layer 14 provides data packet delivery service for both asynchronous

and isochronous data packet transport. This supports both asynchronous data transport,

using an acknowledgement protocol, and isochronous data transport, providing real-time

15   guaranteed bandwidth protocol for just-in-time data delivery. The transaction layer 12

supports the commands necessary to complete asynchronous data transfers, including

read, write and lock. The serial bus management block 10 contains an isochronous

resource manager for managing isochronous data transfers. The serial bus management

block 10 also provides overall configuration control of the serial bus in the form of

20   optimizing arbitration timing, guarantee of adequate electrical power for all devices on

the bus, assignment of the cycle master, assignment of isochronous channel and

bandwidth resources and basic notification of errors.

.Televisions used in consumer electronics systems typically have limited sound

capability. Instead, high quality audio capability is achieved within typical home

25   consumer electronics systems or configurations by connecting a separate audio amplifier

component to the television. This audio amplifier will then amplify audio from a

television or other video receiving device such as a video cassette recorder (VCR), and

send the amplified audio signal to an attached set of speakers.

Corresponding audio and video streams of data are combined into MPEG

30   compressed streams of data for transmission between devices. Audio/video streams of

data are also stored in an MPEG compressed format in order to reduce the amount of

storage space required for the stream of data. A decompression engine is required in

order to decompress an MPEG compressed stream of data at the receiving component. Accordingly, in a consumer electronics system as described above, each component receiving the MPEG data stream must include an MPEG decompression engine. Both the television and the audio amplifier would need to include an MPEG decompression

5   engine in order to separately decompress the video and audio components of the MPEG data stream.

A consumer entertainment system including a settop box, a satellite dish, a television and an audio amplifier is illustrated in Figure 2. The settop box 22 is coupled to receive an MPEG stream of data from the satellite dish 30. The settop box 22

10   includes an MPEG decompression engine to decompress the MPEG stream of data. The settop box 22 is coupled to the television 20 to separately provide the television 20 with the video component from the MPEG stream of data through an analog video interface. The settop box 22 is also coupled to the audio amplifier 24 to separately provide the audio amplifier 24 with the audio component from the MPEG stream of data through an

15   analog audio interface. The audio amplifier 24 is coupled to the speakers 26 and 28 for providing the amplified audio signal to be played on the speakers.

The settop box 22 decompresses an MPEG stream of data received from the satellite dish 30 and separates the audio and video components. The audio and video components are then transmitted from the settop box 22 to the television 20 and the

20   audio amplifier 24, respectively, in order that the video is displayed on the television 20 while the corresponding audio is played from the speakers 26 and 28. The audio and video components are transmitted from the settop box 22 through separate analog interfaces to the appropriate components.

In the configuration illustrated in Figure 2, only the settop box 22 is required to

25   include an MPEG decompression engine. This decompression engine within the settop box 22 is used to decompress both the audio and video components within the MPEG stream of data. The settop box 22 includes separate analog interfaces for transmitting the audio data to the audio amplifier 24 and the video data to the television 20.

What is needed is a system which includes a single decompression engine for

30   decompressing an MPEG stream of data and a single interface through which the audio component and the video component can be transmitted.

SUMMARY OF THE INVENTION:

A separator circuit receives a stream of data including both audio and video components. The separator circuit separates the audio and video components for transmission to appropriate devices. In the preferred embodiment, the separator circuit

5   is part of a decompression engine which decompresses the received stream of data and also separates the audio and video components. Preferably, the decompression engine is implemented within a device configured for coupling to an IEEE 1394-1995 serial bus network. Alternatively, the decompression engine is implemented as a separate dedicated device within the IEEE 1394-1995 serial bus network. After separating the

10   audio and video components, one or both of those components are transmitted from the decompression engine over an isochronous channel on the IEEE 1394-1995 serial bus, to the appropriate devices. When the decompression engine is implemented within a device, an appropriate one of the audio or video components is sent to circuits within the device while the other component is transmitted over the IEEE 1394-1995 serial bus.

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BRIEF DESCRIPTION OF THE DRAWINGS:

Figure 1 illustrates the protocol layers defined by the IEEE 1394-1995 standard.

Figure 2 illustrates a consumer entertainment system of the prior art including a settop box, a television, an audio amplifier and a set of speakers.

20   Figure 3 illustrates a consumer entertainment system including a television having a decompression engine according to the present invention.

Figure 4 illustrates a block diagram schematic of the relevant components within the television having a decompression engine, illustrated in Figure 3.

Figure 5 illustrates a consumer entertainment system including a decompression

25   engine embodied within a separate dedicated device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT:

A decompression engine according to the present invention decompresses a stream of data such as an MPEG stream of data including both audio and video data.

30   The decompression engine also separates the audio and video components from the stream of data. Preferably, the decompression engine is included within a device coupled within an IEEE 1394-1995 serial bus network with other audio and video

devices. Alternatively, the decompression engine is implemented within a separate component coupled within the IEEE 1394-1995 serial bus network. Depending on the configuration and components included within the network, the decompression engine will decompress both the video and audio components of the MPEG stream of data and

5   transmit either or both components isochronously over the IEEE 1394-1995 serial bus to the appropriate devices for output. A device according to the present invention includes a single interface through which both the decompressed audio and video components of the MPEG stream of data are transmitted. When the decompression engine is implemented within a device, an appropriate one of the audio or video components is

10   sent to circuits within the device while the other component is transmitted over the IEEE 1394-1995 serial bus.

An exemplary consumer electronics system coupled together within an IEEE 1394-1995 serial bus network is illustrated in Figure 3. A television 32 is coupled to an audio amplifier 34, a mini disc player and recorder 36, a compact disk player 38, a

15   digital VCR 40 and a digital video disk player 42, through an IEEE 1394-1995 serial bus network 48. The audio amplifier 34 is also coupled to a pair of speakers 44 and 46 through a conventional analog interface. It will be recognized that such a system can include more components or a subset of these components in varying collections and still operate according to the present invention.

20   A block diagram of the relevant components within the television 32 is illustrated in Figure 4. An IEEE 1394-1995 interface circuit 50 includes a physical interface circuit 52 coupled to the IEEE 1394-1995 serial bus 48. Within the television 32, the IEEE 1394-1995 interface circuit 50 is coupled to a decompression engine 54 for decompressing streams of data. The decompression engine 54 is coupled to a controller

25   60 and to a display driver 56. The controller 60 is also coupled to the display driver 56. The display driver 56 is coupled to a display 58 for controlling the information that is displayed on the display 58.

As an example of the operation of the decompression engine 54 within the television 32, when a disk is played from the digital video disk player 42 (Figure 3) for

30   viewing on the television 32, a compressed MPEG stream of data is transmitted from the digital video disk player 42 to the television 32, over an isochronous channel on the IEEE 1394-1995 serial bus 48. This MPEG stream of data includes both video and

audio information. Under control of the controller 60, the decompression engine 54, within the television 32, receives the MPEG stream of data from the IEEE 1394-1995 interface circuit 50, decompresses the MPEG stream of data and separates the audio and video components. The decompression engine 54 then sends the video component to the

5   display driver 56 in order to display the video information on the display 58. The decompression engine 54 also sends the audio component to the IEEE 1394-1995 interface circuit 50 for transmission over the IEEE 1394-1995 serial bus 48 to the audio amplifier 34. The audio component is transmitted from the IEEE 1394-1995 interface circuit 50 to the audio amplifier 34 over an isochronous channel. This isochronous

10   channel is different than the isochronous channel over which the MPEG stream of data is transmitted from the digital video disk player 42 to the television 32. When received by the audio amplifier 34, the audio information is then amplified by the audio amplifier 34 and transmitted to the speakers 44 and 46.

The audio component is transmitted from the television 32 to the audio amplifier

15   34 over an isochronous channel of the IEEE 1394-1995 serial bus 48. Accordingly, the audio amplifier 34 will play each portion of the audio component within its respective time frame. The decompression engine 54 and the controller 60 must ensure that the video information corresponding to the audio information is played within the same time frame in order to simultaneously provide the appropriate video and audio information.

20   In this same example, the separate audio information can also be sent to the mini disc player and recorder 36 for recording. The same isochronous channel can be established to transmit the separate audio information from the television 32 to both the audio amplifier 34 and the mini disc player and recorder 36.

In an alternate embodiment of the present invention, as illustrated in Figure 5,

25   the decompression engine is embodied within a separate dedicated component coupled to the IEEE 1394-1995 serial bus 48. The decompression engine 70 is coupled to the IEEE 1394-1995 serial bus 48. Any compressed MPEG stream of data sent to one or more components coupled to the IEEE 1394-1995 serial bus 48 is first sent to the decompression engine 70 of this alternate embodiment. The decompression engine 70

30   then decompresses the stream of data and if appropriate, separates the audio and video components within the stream of data. The decompressed and separated video component is then transmitted over a first isochronous channel on the IEEE 1394-1995

serial bus 48 to the television 32 or other appropriate device. The decompressed and
separated audio component is transmitted over a second isochronous channel on the
IEEE 1394-1995 serial bus 48 to the audio amplifier 34 or other appropriate device.
Each corresponding portion of the audio and video components are then played

5   simultaneously by the appropriate devices within the appropriate time period, in order to
ensure that a correct correspondence is maintained between the audio and video
information being played.

As should be apparent to those skilled in the art, the decompression engine of the
present invention can be implemented within any appropriate device, such as the

10   television 32, the audio amplifier 34, the mini disc player and recorder 36, the compact
disk player 38, the digital VCR 40 and the digital video disk player 42, as illustrated in
Figure 3, or as a separate component, as illustrated in Figure 5. The decompression
engine of the present invention embodies any appropriate method for decompressing a
compressed stream of data and separating the components within the stream of data.

15   While an MPEG stream of data has been used as an example in the discussion above, it
should be apparent to those skilled in the art, that the decompression engine could be
used to decompress a data stream which has been compressed according to any
appropriate format. It also should be apparent that the present invention could be used
on an uncompressed stream of data which includes two or more components. In the

20   situation of an uncompressed stream of data, the components are separated without being
decompressed and then transmitted isochronously to the appropriate devices.

The decompression engine of the present invention is advantageous over the
settop box 22, illustrated in Figure 2, because it provides a single interface through
which the separate audio and video components are transmitted. In the preferred

25   embodiment, this single interface is an IEEE 1394-1995 interface circuit. As described
above, the IEEE 1394-1995 serial bus provides the advantage of a digital interface,
allowing the separate audio and video components to be transmitted digitally, without
requiring the separate components to first be converted to an analog format before
transmission. The separate components are also transmitted isochronously, thereby

30   ensuring that the corresponding audio and video information is played within appropriate
time periods in order that the correct correspondence is maintained between the audio
and video information being played.

By implementing the decompression engine within the television 32 or as a separate device 70, a general purpose audio component which only understands uncompressed audio data, such as the audio amplifier 34, can be used in an environment, as illustrated in Figures 3 and 5, where the only audio information available is compressed and/or embedded in another stream of data. In such a configuration, the audio information is decompressed and separated before it is transmitted to the audio amplifier 34. When the audio information is received by the audio amplifier 34, the audio information is amplified, converted to an analog format and sent to the speakers 44 and 46.

The present invention has been described in terms of specific embodiments incorporating details to facilitate the understanding of principles of construction and operation of the invention. Such reference herein to specific embodiments and details thereof is not intended to limit the scope of the claims appended hereto. It will be apparent to those skilled in the art that modifications may be made in the embodiment chosen for illustration without departing from the spirit and scope of the invention. Specifically, it will be apparent to those skilled in the art that while the preferred embodiment of the present invention is used with an IEEE 1394-1995 serial bus structure, the present invention could also be implemented on any other appropriate bus structures.

C L A I M S

I Claim:

1   1.   An apparatus for receiving a combined stream of data having a plurality
2   of components comprising:
3   a.   an interface circuit (50) configured for coupling to a bus structure (48) for
4   receiving and transmitting data over the bus structure (48) including the
5   combined stream of data having the plurality of components; and
6   b.   a separating circuit coupled to the interface circuit (50) for separating the
7   plurality of components into separate component streams of data, wherein
8   at least one of the separate component streams of data is transmitted
9   through the interface circuit (50) over the bus structure (48) to a remote
10   device.

1   2.   The apparatus as claimed in claim 1 further comprising a decompression
2   engine coupled to the separating circuit and to the interface circuit (50) for
3   decompressing the combined stream of data.

1   3.   The apparatus as claimed in claim 2 wherein the bus structure (48) is an
2   IEEE 1394-1995 serial bus structure.

1   4.   The apparatus as claimed in claim 3 wherein the separate component
2   stream of data is transmitted to the remote device on an isochronous channel on the
3   IEEE 1394-1995 serial bus structure.

1   5.   The apparatus as claimed in claim 2 wherein the combined stream of data
2   is received in an MPEG format.

1   6.   The apparatus as claimed in claim 2 wherein the apparatus is implemented
2   within a local device and further wherein at least one of the separate component streams
3   of data is sent to components within the local device.

1   7.   The apparatus as claimed in claim 2 wherein the apparatus is implemented

2   within a remote device and further wherein at least one of the separate component

3   streams of data is sent to components within a local device.

1   8.   The apparatus as claimed in claim 7 wherein the separate component

2   streams of data represent audio and video data.

1   9.   A method of receiving a combined stream of data and separating

2   components from the combined stream of data comprising the steps of:

3   a.   receiving the combined stream of data including a plurality of components

4   through an interface circuit (50);

5   b.   separating the plurality of components into separate component streams of

6   data; and

7   c.   transmitting one or more of the separate component streams of data

8   through the interface circuit (50) to a remote device.

1   10.   The method as claimed in claim 9 further comprising the step of

2   decompressing the combined stream of data.

1   11.   The method as claimed in claim 10 wherein the interface circuit (50) is

2   coupled to a bus structure (48).

1   12.   The method as claimed in claim 11 wherein the combined stream of data

2   is received in an MPEG format.

1   13.   The method as claimed in claim 12 wherein the separate component

2   streams of data represent audio and video data.

1   14.   The method as claimed in claim 13 wherein the bus structure (48) is an

2   IEEE 1394-1995 bus structure.

1   15.   A decompression engine for decompressing a compressed stream of data

2   including a plurality of components, comprising:

3   a.   an interface circuit (50) configured for coupling to a bus structure (48) for

4   receiving and transmitting data over the bus structure (48) including a

5   combined stream of data having the plurality of components;

6   b.   a decompression circuit coupled to the interface circuit (50) for

7   decompressing the combined stream of data thereby forming a

8   decompressed stream of data; and

9   c.   a separating circuit coupled to the decompression circuit for separating the

10   plurality of components within the decompressed stream of data into

11   separate and decompressed component streams of data, wherein at least

12   one of the separate and decompressed component streams of data is

13   transmitted through the interface circuit (50) over the bus structure (48) to

14   a remote device.

1   16.   The decompression engine as claimed in claim 15 wherein the

2   decompression circuit is included within a local device and further wherein at least one

3   of the separate and decompressed component streams of data is sent to components

4   within the local device.

1   17.   The decompression engine as claimed in claim 16 wherein the compressed

2   stream of data is received in an MPEG format.

1   18.   The decompression engine as claimed in claim 17 wherein the separate

2   and decompressed component streams of data represent audio and video data.

1   19.   The decompression engine as claimed in claim 18 wherein the bus

2   structure (48) is an IEEE 1394-1995 serial bus structure.

1   20.   A television for displaying video information comprising:

2   a.   a display (58) for displaying video information;

3   b.   a display driver (56) coupled to the display (58) for controlling the

4   display (58) and providing the video information to be displayed;

5   c.   an interface circuit (50) configured for coupling to a bus structure (48) for

6   receiving and transmitting data over the bus structure (48) including a

7   combined stream of data having audio and video components; and

8   d.   a decompression engine (54) coupled to the interface circuit (50) and to

9   the display driver (56) for decompressing the combined stream of data

10   thereby forming a decompressed stream of data and separating the

11   decompressed stream of data into an audio stream of data and a video

12   stream of data, wherein the audio stream of data is transmitted through

13   the interface circuit (50) and over the bus structure (48) to a remote

14   device and the video stream of data is sent to the display driver (56) to be

15   displayed on the display (58).

1   21.   The television as claimed in claim 20 wherein the combined stream of

2   data is received in an MPEG format.

1   22.   The television as claimed in claim 20 wherein the bus structure (48) is an

2   IEEE 1394-1995 serial bus structure.

1   23.   The television as claimed in claim 22 wherein the combined stream of

2   data is received on a first isochronous channel.

1   24.   The television as claimed in claim 23 wherein the audio stream of data is

2   transmitted on a second isochronous channel.

1   25.   An apparatus for receiving a combined stream of data having a plurality

2   of components comprising:

3   a.   an interface circuit (50) configured to couple to a bus structure (48) and

4   to receive and transmit data over the bus structure (48) including the

5   combined stream of data having the plurality of components; and

6   b.   a separating circuit coupled to the interface circuit (50) to separate the

7   plurality of components into separate component streams of data, wherein

8   at least one of the separate component streams of data is transmitted

9   through the interface circuit (50) over the bus structure (48) to a remote

10   device.

1   26.   The apparatus as claimed in claim 25 further comprising a decompression

2   engine coupled to the separating circuit and to the interface circuit (50) to decompress

3   the combined stream of data.

1   27.   The apparatus as claimed in claim 26 wherein the bus structure (48) is an

2   IEEE 1394-1995 serial bus structure.

1   28.   The apparatus as claimed in claim 27 wherein the separate component

2   stream of data is transmitted to the remote device on an isochronous channel on the

3   IEEE 1394-1995 serial bus structure.

1   29.   The apparatus as claimed in claim 26 wherein the combined stream of

2   data is received in an MPEG format.

1   30.   The apparatus as claimed in claim 26 wherein the apparatus is

2   implemented within a local device and further wherein at least one of the separate

3   component streams of data is sent to components within the local device.

1   31.   The apparatus as claimed in claim 26 wherein the apparatus is

2   implemented within a remote device and further wherein at least one of the separate

3   component streams of data is sent to components within a local device.

1   32.   The apparatus as claimed in claim 31 wherein the separate component

2   streams of data represent audio and video data.

1   33.   A home entertainment system comprising:

2   a.   a plurality of devices;

3   b.   an IEEE 1394-1995 serial bus structure (48) coupled between the plurality

4   of devices to transmit data between the devices including a combined

5   stream of data having a plurality of components; and

6   c.   a decompression engine coupled to the bus structure (48) and to the

7   plurality of devices to decompress the combined stream of data, thereby

8   forming a decompressed stream of data, and separate the decompressed

9   stream of data into an audio stream of data and a video stream of data,

10   wherein the audio stream of data is transmitted to one or more of the

11   plurality of devices and the video stream of data is transmitted to one or

12   more of the plurality of devices, the decompression engine including:

13   i.   an interface circuit (50) coupled to the bus structure (48) to

14   receive and transmit data over the bus structure (48)

15   including the combined stream of data, the audio stream of

16   data and the video stream of data;

17   ii.   a decompression circuit coupled to the interface circuit to

18   decompress the combined stream of data to form the

19   decompressed stream of data; and

20   iii.   a separating circuit coupled to the decompression circuit to

21   separate the plurality of components into the audio stream

22   of data and the video stream of data, wherein at least one

23   of the audio stream of data and the video stream of data is

24   transmitted through the interface circuit (50) over the bus

25   structure (48) to a remote one of the plurality of devices.

1   34.   The home entertainment system as claimed in claim 33 wherein the

2   decompression engine is included within one of the plurality of devices.

1   35.   The home entertainment system as claimed in claim 33 wherein the

2   decompression engine is a stand-alone device.

1   36.   The home entertainment system as claimed in claim 33 wherein the

2   combined stream of data is received by the decompression engine in an MPEG format.

1   37.   The home entertainment system as claimed in claim 33 wherein the

2   plurality of devices include a television and an audio amplifier.
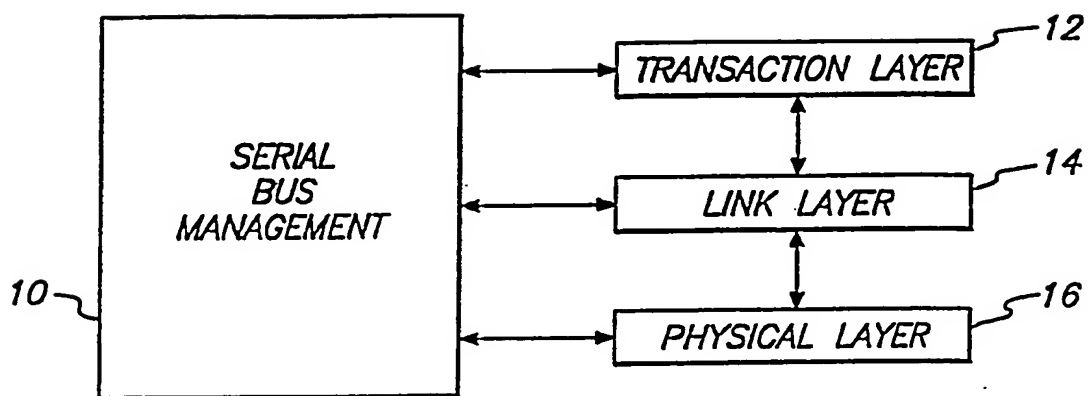
FIG. 1

(PRIOR ART)
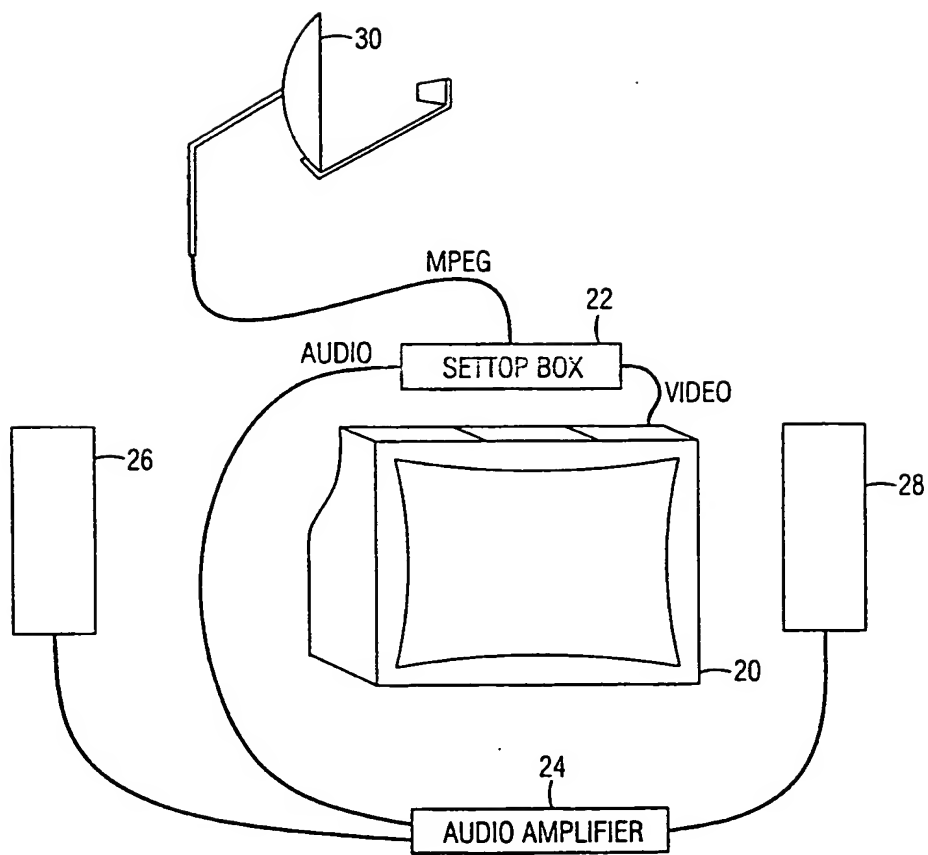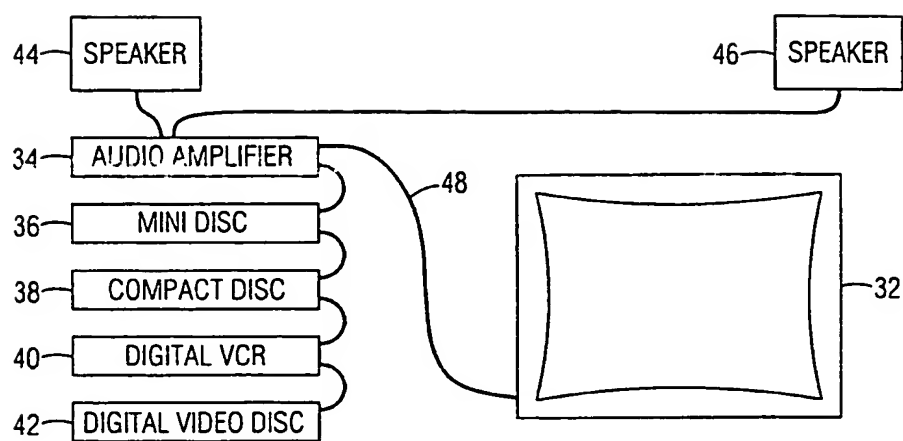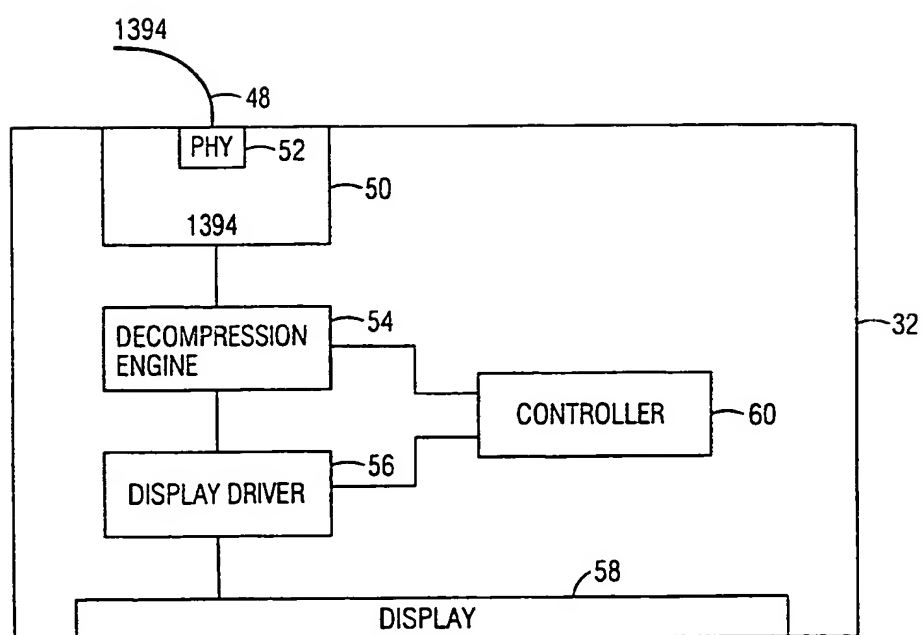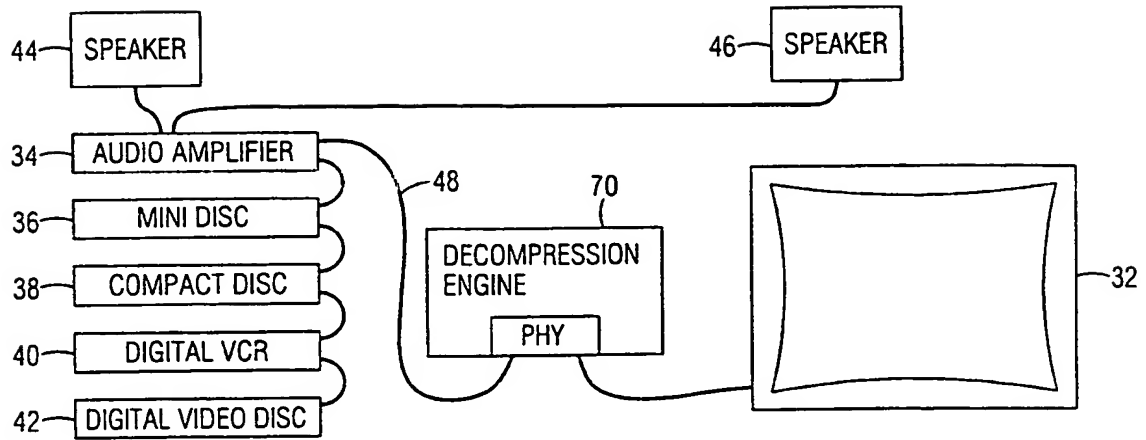
Fig. 2
Prior Art

3/5

Fig. 3

4/5

Fig. 4

Fig. 5

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6   H04N7/52

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6   H04N   G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 97 37202 A (MICROSOFT CORP) 9 October 1997 see the whole document	1-37
A	HOFFMAN G ET AL: "IEEE 1394: A UBIQUITOUS BUS" DIGEST OF PAPERS OF THE COMPUTER SOCIETY COMPUTER CONFERENCE (SPRING) COMPCON, TECHNOLOGIES FOR THE INFORMATION SUPERHIGHWAY SAN FRANCISCO, MAR. 5 - 9, 1995, no. CONF. 40, 5 March 1995, pages 334-338, XP000545446 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS see paragraph 4.1	1-37

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[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 August 1998	03/09/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Foglia, P

1

page 1 of 2

INTERNATIONAL SEARCH REPORT

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	BLOKS R H J: "THE IEEE-1394 HIGH SPEED SERIAL BUS" PHILIPS JOURNAL OF RESEARCH, vol. 50, no. 1/02, July 1996, pages 209-216, XP000627671 see paragraph 3	1-37
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